LOADTEST
O-Cell® Technology in Frankfurt, Germany

Project:	**FrankfurtHochVier**
Location:	Frankfurt am Main, Germany
Developer:	MAB joint venture with BPF
Geotechnical Engineer:	Ingenieursozietät Professor Dr.-Ing. Katzenbach GmbH Dr Matthias Vogler
Foundation Contractor:	Bilfinger Berger AG, Bauer Spezialtiefbau GmbH, and Hochtief Construction AG
Fugro Loadtest Germany:	Scanrock GmbH: Carlos Fischer

Project Description:

The Zeil, Frankfurt am Main was the site of the first Osterberg cell test in Germany. In April 2004, the largest static load pile test on German soil was performed using Osterberg cells, in the heart of Frankfurt. The bi-directional load test was aimed at confirming the foundation design, before demolition of some of the surrounding older structures. The test was performed on a 1.68 m diameter test pile 47 m long, installed 12 m into the Frankfurt limestone.

Cage and O-cell assembly fabricated off-site

This large site is located within the heart of the Frankfurt city centre, on the main shopping street, "Zeil". This street is amongst those of the highest pedestrian traffic in Germany. The "FrankfurtHochVier" project is a Class-A mixed-use project. Only a small part of the existing structure will remain, namely, the historical building known as the porticos of the "Thurn und Taxis Palais". The development is one of the most significant in Europe of its time.

Test Reference Beam and instrumentation

Six O-cells were installed on two separate levels to allow the behavior of three elements of the pile in the rock socket to be evaluated independently. The cage assembly with O-cells was manufactured off-site in sections and assembled over the bore during installation. Utilizing a feature unique to bi-directional tests, only the section of pile in the rock socket was concreted and the remainder of the bore (35 m) backfilled with granular material for stabilization. Subsequently the pile was base grouted and a 5 m test section shaft grouted (It is typical practice to shaft and base grout piles in the Frankfurt limestone).

The load test was carried out in two stages as is necessary with a multilevel O-cell arrangement:

- In the first stage, the upper 5 m of rock socket was loaded to 24 MN;
- In the second stage, the lower 5 m section was loaded against the bottom 2.5 m of pile.

Until now, designers have had to rely on full scale loading test data from 146 mm diameter anchors. In practice, there would have been insufficient space to perform a traditional top down loading test even to lesser loads on reduced size test piles and interpretation of the results from the rock socket would have been extremely difficult. The test succeeded in mobilising a total capacity of 78 MN in the rock socket.

Installation of the bottom section of reinforcing cage with both O-cell arrangements